

### **Amendments to the Claims:**

All of the claims are set forth herein with the current status of each noted and the currently amended claims showing the changes made therein. This listing of claims will replace all prior versions and listings of claims in the application.

Please cancel claims 12-15, 20, 23 and 24, rewrite claims 16-19, 21, and 22, and add new claims 25-40. The claims as amended are set out as follows:

### **Listing of Claims:**

1-9 [cancelled]

10. (currently amended) A three-dimensional structure, comprising:

a first lithographically-defined layer;

a second lithographically-defined layer on top of said first lithographically-defined layer;

said second lithographically-defined layer being mechanically supported by said first lithographically-defined layer; and

wherein at least one of said layers is a conducting polymer.

11. (currently amended) The three-dimensional structure of claim 10, including:

a photosensitive barrier film positioned at the interface between said first and second lithographically-defined layers.

12. [Cancelled]

13. [Cancelled]

14. [Cancelled]

15. [Cancelled]

16. (currently amended) The optical device of claim 45 25, wherein said ~~photosensitive material~~ lithographically definable material is a positive photoresist material, wherein said exposed pattern is removed by development and unexposed portions of said layers form said optical device.

17. (currently amended) The optical device of claim 45 25, wherein said ~~photoresist material~~ lithographically definable material is a negative photoresist material, whereby said exposed pattern forms said optical device upon development of said photoresist material.

18. (currently amended) The optical device of claim 45 25, wherein ~~photosensitive material~~ lithographically definable material of at least one of said layers is a first photoresist material and the ~~photoresist material~~ lithographically definable material of ~~the remaining at least a second of~~ said layers is a second photoresist material.

19. (currently amended) The optical device of claim 42 25, wherein each of said barrier layers is a ~~lithographically definable layer~~ photosensitive material.

20. [Cancelled]

21. (currently amended) The optical device of claim 42 19, wherein the

pattern formed in each of said lithographically definable layers is of a different shape.

22. (currently amended) The optical device of claim 42 21, wherein each of said lithographically definable and barrier layers is optically transparent.

23. [Cancelled]

24. [Cancelled]

25. (New) A monolithic optical coupler integrally fabricated on an optical chip and having a solid, void-free, multilevel three-dimensional shape comprising:

a first layer of ~~photosensitive material~~ lithographically definable material on a top surface of said chip, said first layer being individually and at least partially exposed lithographically to define an arbitrary first layer pattern corresponding to the shape of a first level of the multilevel optical coupler;

multiple additional layers of ~~photosensitive material~~ lithographically definable material, each additional layer being on a top surface of a preceding layer, each additional layer being individually and at least partially exposed lithographically to define vertically aligned arbitrary patterns corresponding to the shapes of respective levels of the multilevel optical coupler;

a barrier between each of said layers of ~~photosensitive material~~ lithographically definable material; and

said layers, upon development, being of a selected arbitrary shape and being vertically aligned and stacked to form said solid, three-dimensional, multilevel monolithic optical coupler for connecting an optical device on said chip to an another optical device either on the chip or external to it.

26. (New) A monolithic, multilevel, three-dimensional structure integrally fabricated on a chip, comprising:

a first layer of ~~photosensitive material~~ lithographically definable material on a top surface of said chip, said first layer being individually and at least partially exposed lithographically to define an arbitrary first layer pattern corresponding to the shape of a first level of the multilevel structure;

multiple additional layers of ~~photosensitive material~~ lithographically definable material, each additional layer being located on and supported by the top surface of a preceding layer, each additional layer being individually and at least partially exposed lithographically to define corresponding arbitrary patterns in each additional layer, the patterns defining vertically aligned and at least partially overlapping layers, the pattern of each lithographically-defined layer corresponding to the shape of a corresponding level of the multilevel structure;

a barrier between each of said lithographically-defined layers of ~~photosensitive material~~ lithographically definable material; and

said lithographically-defined layers, upon development, being of such arbitrary shape and vertical alignment as to form a solid, three-dimensional, multilevel monolithic structure on said chip.

27. (New) The structure of claim 26, wherein said lithographically-defined layers are of arbitrary thickness.

28. (New) The structure of claim 26, wherein the pattern of at least one of said lithographically-defined layers defines a nonperiodic level in said structure.

29. (New) The structure of claim 26, wherein said structure is an optical coupler for connecting an optical device on said chip to another optical device either on the chip or external to it.

30. (New) The structure of claim 26, wherein said ~~photosensitive material~~ lithographically definable material is a positive photoresist material, wherein said exposed pattern is removed by development, and wherein unexposed portions of said layers form said levels of said structure.

31. (New) The structure of claim 26, wherein said ~~photosensitive material~~ lithographically definable material is a negative photoresist material, wherein said exposed pattern form said levels of said structure upon development of said photoresist material.

32. (New) The structure of claim 26, wherein the ~~photosensitive material~~ lithographically definable material of at least one of said layers is a first photoresist

material and the ~~photosensitive material~~ lithographically definable material of at least a second of said layers is a second photoresist material.

33. (New) The structure of claim 26, wherein the pattern formed in each of said lithographically-defined layers is of a different shape.

34. (New) The structure of claim 26, wherein each of said lithographically-defined layers is optically transparent.

35. (New) The structure of claim 26, wherein the ~~photosensitive material~~ lithographically definable material of each layer is selected from the group of ~~lithographically definable materials~~ comprising optically transmissive polymer and positive or negative photoresist materials.

36. (New) The structure of claim 26, wherein the pattern of at least one of said lithographically-defined layers defines a periodic level in said structure.

37. (New) The structure of claim 26, wherein said structure comprises at least three levels, each level having an arbitrary size and shape.

38. (New) The structure of claim 26, wherein said barrier is a photosensitive material.

39. (New) The structure of claim 26, wherein said barrier is a photosensitive material comprising a lithographically definable material and a water soluble material such as CEM365IS.

40. (New) A photonic crystal structure, comprising:  
a first lithographically-defined layer;  
a second lithographically-defined layer on top of said first layer; and  
said second lithographically-defined layer being mechanically supported by said first lithographically-defined layer;  
wherein said lithographically-defined layers are periodic in a direction parallel to each other.